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METHOD OF MAKING A MOLD AND MOLDING A BIFOCAL LENS

Abraham Gitson, 15705 Van Blvd.,
Cleveland, Ohio 44120

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ABSTRACT OF THE DISCLOSURE

The invention is concerned with the manufacture of bifocal lenses and the like, in which the reading and distance fields are entirely independent of each other; with the reading fields being decentered nasalward from the distance fields, and with each field being set accurately at the required interpupillary distance, whereby eyestrain resulting from use of the lenses is virtually eliminated.

In the Whitney Pat. 3,109,696, a method of making plastic lenses is described, in which a mold portion for casting plastic lenses is formed by mounting a first disk of relatively rigid material, such as glass, having a relatively high melting point on a holder, dividing the disk into two section, grinding and polishing a predetermined first surface curvature on the exposed side of the divided disk, mounting a second disk of a rigid material, such as flint or barium crown glass, having a lower melting point than the first disk onto a holder, dividing the second disk into two sections, removing the respective divided disks from their holders, placing the divided edge of a section of the first disk in edge-to-edge relation with the divided edge of a section of the second disk, securing the edges together while in said relation and grinding and polishing a second surface on the assembled sections of a predetermined curvature in overlapping relation with and at such an angle with respect to the first surface formed on the section of the first disk as to position the ultimate optical center of the cast lens resulting from said surface at a desired location and simultaneously controlling the depth of said grinding and polishing of said second surface so as to reduce the focal field resulting from said first surface to the desired size and shape.

The first surface referred to is designed to produce the "reading" field in the cast lens, while the second surface is designed to produce the "distance" field in the cast lens.

The edges, in one instance, are secured together by fusion, and while it is stated in the patent that the temperature of fusion is controlled, as is possible by reason of the different softening points of the respective glasses of the segments, so that the previously ground and polished surface of the reading field will not distort during the fusing, but since fusion of the edges implies or necessitates actual melting of the edges, it is virtually impossible, irrespective of the nature of the glasses used for the segments, to avoid substantial distortion of the ground and polished surface of the reading field, which, after the segments are fused together, cannot be reground.

The patent further discloses that although the segments for the reading portion and distance portion of the mold are preferably fused together, that they may also be joined by cementing or the like, but this does not obviate the grinding and polishing of the second surface on the assembled section.

It is further obvious from the disclosure in the aforesaid Whitney patent that in grinding and polishing the second surface, that this surface is ground about a center which lies on a line normal to and which passes through

the reading portion of the lens at the location desired of the optical center of the reading portion, so that the center of the reading portion of the ultimate lens and the center of the distance portion of such lens coincide, as a result of which these centers, when the lenses are mounted in a frame, have the same interpupillary distance.

The distance portions of the lenses, as made in accordance with the Whitney patent, have little or no correction for distance vision, so that if the optical centers of the reading portions of the lenses are at the required interpupillary distance, it is inconsequential that the distance portions of the lenses are at the same interpupillary distance as the reading portions.

However, if the distance portions of the lenses are designed or required to have substantial correction for distance vision, as, for example, in lenses made for post-operative cataract patients, is is essential that the distant portions of the lenses be at a required interpillary distance or spacing which is different than the interpupillary distance or spacing of the reading portions of the lenses, since otherwise the patient or wearer of the lenses, in looking through the reading portions of the lenses which are of themselves at the proper interpupillary spacing, is subjected to considerable eyestrain by reason of the effect of the distance portions of the lenses on the eye muscles.

Ordinary bifocal lenses are laid out by placing the centers of the distance or major portions of the lenses, at the exact interpupillary spacing required for the distance vision. The reading segments are then decentered nasalward to the spacing required for the reading interpupillary dimension. This, however, is not accomplished in the aforesaid Whitney patent, and such decentering has heretofore been confined to conventional methods of making bifocal or multifocal lenses, as, for example, as disclosed in the Hancock Pat. 3,245,745.

In making bifocal lenses by such conventional methods, and particularly where the lenses have any substantial degree of correction for distance vision, the patient, as previously noted, is subjected to considerable eyestrain due to the effect on the eye muscles of having to look through the distance fields or portions of the lenses at the same time he is reading and looking through the reading fields or portions of the lenses.

My invention has as its primary object the manufacture of bifocal plastic lenses having reading and distance portions or fields which are entirely independent of each other, with the reading portions or fields being decentered nasalward from the distance portions or fields, and with each portion or field being set accurately at the required interpupillary distance, whereby the eyestrain to which reference has been made is virtually eliminated.

Another object of the invention is to provide a method of molding such lenses, as well as to provide the molds themselves.

A further object of the invention is to provide a method for molding such lenses, in which glass disks or segments of disks are employed as molds for making the plastic lenses, and the disks are ground and polished to provide the desired finished curvature for the convex side of the lenses, as well as the required depth and area for the reading and distance portions of the lenses.

A still further object of the invention is to provide a method of the character described, in which no fusion is required, so that no distortion of the mold surfaces can occur, whereby accuracy in the molding or casting of the lenses is assured.

A still further object of the invention is to provide a method of the character described, in which the step of